# **Utah Department of Transportation**

**Project Development Group** 

**Engineering Services and Bridge Design Section** 

# UDOT Construction Manager General Contract (CMGC)

# **ANNUAL REPORT**

By

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#### INTRODUCTION

The Utah Department of Transportation (UDOT) and the Federal Highway Administration (FWHA) have entered into an agreement to implement and evaluate a program of projects utilizing the Construction Manager General Contract (CMGC) contracting method. The UDOT plan for the CMGC contracting method was approved by FWHA on October 19, 2006. This report is part of the agreement to submit an annual report to include a summary of projects, budget analysis schedule analysis change order analysis, lessons learned, innovation analysis and analysis of performance measures.

#### SUMMARY OF PROJECTS

Federal funding is authorized for 24 projects over a 2-year period. There is an additional 24 projects authorized for state only funding. The projects are to consist of 6 projects in each of the 4 UDOT Regions to provide data that varies geographically. In addition 6 project types are identified as local government projects, bridge projects, ITS projects, large project, mixed construction project and miscellaneous projects. To date there are 4 approved Federal projects and one pending. There are 4 approved state projects and 2 pending. The Federal projects are listed in table 1 and the state projects are in table 2. Additional detail to include project descriptions is found in Appendix A.

As part of our agreement with FWHA this report provides projects descriptions, budget analysis, schedule analysis, change order analysis, design feedback, constructability feedback, innovations, risk, and lessons learned. Information to answer these topics was collected by interviewing each of the individual Project Managers, by obtaining feedback from contractors through their Associated General Contractors representatives, and by direct observation of projects. Details provided by Project Managers are found in Appendix A. Feedback from AGC members is provided in Appendix B. What follows is a summary.

| CMGC Program  | Р         | roj    | ect         | Туј   | pes       |               | TABLE 1        |     |                   |       |         |   |              |                      |
|---|-----------|--------|-------------|-------|-----------|---------------|----------------|-----|-------------------|-------|---------|---|--------------|----------------------|
| ຼິດ<br>ອີ<br><mark>ຜ</mark><br>Project Name                         | Local Gov | Bridge | ITS Project | Large | Mixed Con | Miscellaneous | Project#       | PIN | Project<br>Status | State | Federal |   | FHWA<br>Appr | Cost \$k<br>Estimate |
| 1<br>No Federal Projects  |           |        |             |       |           |               |                | •   |                   | •     |         |   |              |                      |
| <sup>2</sup> Redwood Road   |           |        |             | Х     |           |               | STP-0068(15)55 | 344 | 10Const           | 0     | Х       | С | Yes          | 14,549               |
| 4500 South & I-215  |           | Х      |             |       |           |               | F-I215(126)13  | 475 | 52Const           | 0     | Χ       | С | Yes          | \$5,000              |
| <sup>3</sup> I-15 Bridge Deck Repairs,<br>Spanish Fork to Santaquin |           | х      |             |       |           |               | F-R399(23)     | 614 | 12 AWD            | 0     | Х       | С | Yes          | \$5,500              |
| Southern Corridor   |           |        |             | Х     |           |               | HPP-LC53(33)   | 55′ | 14Const           | 0     | Χ       | С | Yes          | \$38,000             |
| Virgin River Trail Phase I & II,<br>Washington City                 | х         |        |             |       |           |               | F-LC53(37)     | 584 | 10 AWD            | 0     | Χ       | С | Yes          | \$1,625              |

Table 1 Federal CMGC projects

Legend Appr = Awaiting approval

AWD = Awarded and in design

Const = in construction

C = Completed

P = Justification provided and in review

NA Not Applicable NI Not Initiated

| <b>STATE CMGC Program</b>   | Pro                 | ject        | Ту    | pes           | TABLE 2          |                       |       |         |    |              |                      |
|---|---------------------|-------------|-------|---------------|------------------|-----------------------|-------|---------|----|--------------|----------------------|
| ບ<br>ເວົ້າ<br>ເວົ້າ<br>ເປັ<br>ເປັ<br>ເປັ<br>ເປັ<br>ເປັ<br>ເປັ<br>ເປັ<br>ເປັ<br>ເປັ<br>ເປັ | Local Gov<br>Bridge | ITS Project | Large | Miscellanding | Project #        | Project<br>PIN Status | State | Federal |    | FHWA<br>Appr | Cost \$k<br>Estimate |
| <sup>1</sup> Parrish Lane @ I-15  |                     |             |       | X             | S-I-15-7(243)320 | 6111Const             | x     | 0       | С  | NA           | \$1,250              |
| Riverdale Road  | Х                   | 2           | X     |               | SP-0026(4)0      | 2495AWD               | Х     | 0       | С  | NA           | \$45,000             |
| <sup>2</sup> 5600 West; 5000 to 6200 South  |                     |             |       | Х             | SP-0172(12)3     | 5715Const             | х     | 0       | С  | NA           | \$2,000              |
| 5600 West; 4450 to 4700 South   |                     |             |       | X             | SP-0172(11)2     | 5652Const             | х     | 0       | С  | NA           | \$0                  |
| I-80 Wendover; Aria Blvd.   |                     |             |       | X             | S-I80-1(44)0     | 5975Const             | х     | 0       | С  | NA           | \$4,400              |
| I-80 State St to 1300 East  | Х                   | 2           | X     |               | SP-80-3(68)121   | 4303AWD               | х     | 0       | С  | NA           | \$130,000            |
| No State Projects   |                     |             |       |               |                  |                       |       |         |    |              |                      |
| <sup>4</sup> I-70 Eagle Bridge  | Х                   |             |       |               | S-170-1(61)21    | 6059Appr              | х     | 0       | NI | NA           |                      |
| SR-9 in Hurricane   |                     | 2           | X     |               | S-0009(15)9      | 5978Appr              | Х     | 0       | Р  | NA           | \$14,550             |

Table 2 State CMGC projects

#### **BUDGET ANALYSIS**

As far as we can determine at this time the CMGC process has no positive or negative effect on the project budget. This may change over time if the trend of spending less for design continues into future projects. From the experience of the AGC members the funding saved on a project is usually reprogrammed for additional work to be accomplished. The scope of a project expands to spend the funds available. This practices makes it difficult to compare change orders for traditions vs. CMGC projects.

#### **SCHEDULE ANALYSIS**

The CMGC process has reduced the schedule for most projects. Part of the reason for this is the time saved in the design effort. The contractor's participation helps to identify solutions quickly and speeds up the design process. Their participation also reduces the detail that must be communicated to the contactor in drawings and specifications

CMGC in general allows a project to begin at risk. One project began before the railroad right of way issues were cleared and was able to complete a year early. By careful construction planning the railroad work was saved for last and right of way issues were cleared in time to complete the project on schedule.

Choosing a contractor in the design process also helps to clear utility issues. Utility companies move more quickly to plan and execute solutions when they know the contractor they will be working with.

Phasing helps to reduce schedule time. Long lead items were purchased during design that would be used latter in construction. This is not without some risk.

#### **CHANGE ORDERS**

Our first CMGC project had a lot of difficulty. It was a new process and not well understood. There were 12 change orders with the first one due to a delay in project start and increased prices. The project was delayed because negotiations were long and difficult. Several change orders were for items that could have been cleared up in design but due to our inexperience with the process we used change orders.

The 4500 South and I-215 bridge replacement had one change order because we did not know how to set up phases to the project.

The Parrish Lane @ I-15 had seven change orders. Some of these changer orders were initiated by UDOT to spend additional funds on the project because we had funds remaining after negotiations.

Comparing the CMGC process to the traditional Design Bid Build will take additional analysis because UDOT will frequently use change orders as a method of expending additional funds. This is true for all projects and independent of the contracting method used. Analysis will require a project-by-project analysis to create comparable data.

#### **DESIGN FEEDBACK**

The program managers and AGC representatives agree that contractor participation in design minimized risk and improved schedule. Design consultants preferred this method because UDOT controlled the design and innovations selected for the project. This gave them a greater ability to develop a quality design. However, contractors felt that CMGC takes away their control over the project schedule, which they enjoy in a Design Build process.

Program Managers found that the CMGC process reduced the schedule because the design was completed more rapidly. This occurred because the contractor provided advice on the best way to construct and the designer could tailor the design to the contractor's strengths and abilities. They also helped to identify cost saving solutions. As an example the Riverdale Road project found a \$280k savings the first week the contractor began to participate in design. The contractor also helped to plan construction phasing which enabled the team to prioritize utilities, and clear right-of-way. With the contractors participation long lead items were identified and procured.

AGC members recommend that the contractor be selected at the same time as the designer and more time be spent in design. However, in practice the contractor and the Program Manager push the designer to complete more quickly. Program Managers and contractors are motivated to reduce the schedule. The contractor makes money when construction begins and the PM is usually pushed to deliver in less time. However, a shortened design schedule can introduce design errors and it makes the negotiation process more difficult because no one is able to spend the time necessary to create an accurate cost estimate. The engineers cost estimate, Independent Cost Estimate, and Contractors bid are full of errors that must be worked out in negotiations.

#### CONSTRUCTABILITY FEEDBACK

The CMGC process gives the contractor more time to understand and improve the design and to learn new construction methods not used before. Constructability is continuously reviewed in the design phase so the design is optimized for construction and project cost are reduced. The contractor is able to inform the team what construction methods would simplify construction and reduce cost and schedule.

#### **INNOVATIONS**

Most innovations were traditional methods that many contractors know and use. These innovations are specific to individual CMGC projects and are directed at reducing cost and improving constructability. Out of the box innovations that the contractors would not have chosen on their own were the result of UDOT choices. Accelerated Bridge Construction such as used on the 4500 South Bridge over I-215 was UDOT's choice. No local contractor would have taken this risk independently. It required a decision by UDOT and a willingness of UDOT to pay the additional expense and cover the risk. CMGC makes this choice possible and brought the contractor on board early to reduce risk by learning what needed to be done to accomplish the task.

#### RISK

Most of the risk associated with CMGC was our lack of experience with a process that was undefined and undocumented. It is difficult to anticipate all the mistakes that can occur but as we have identified problems we have improved the process and educated Program Managers to reduce risk. To mitigate this risk we have developed process flows and descriptions found in Appendix C of this document. This is an ongoing effort that will improve over time.

One of these risks is the tendency of contractors to push the design to be completed too rapidly. This can introduce design errors and initiate early phasing before we are ready. Early phasing has the risk of committing us to the contractor for construction before the design is complete and this compromises negotiations for a fair price.

Not all risk can be identified and eliminated from the design. CMGC minimizes risk but it does not eliminate it. Underground work for example cannot be one hundred percent predicted even when the design is complete.

#### LESSONS LEARNED

One CMGC project had a tight time schedule in which resourceful creative actions were taken to involve the contractor in construction before negotiations occurred. This project initiated an early phase contract for materials that was modified by six change orders and an emergency change order to get the contractor working early and reduce construction time. Management intervened and process corrections were made to minimize damage and prevent future surprises. This has led us to conclude that CMGC is not the best choice for schedule driven projects.

Price is important in the selection process because:

- 1. Price motivates the contractor to think about the task and focus on the detail of what has to be done. Until the contractor has put a price to the task it is only an intellectual exercise.
- 2. Price brings cost competition and the innovation to deliver an affordable project
- 3. Price documents costs and approach to cost that we can use in negotiations
- 4. Contractors who honor their cost proposals show accountability and we can use their commitment to a reasonable price in the selection for future projects.
- 5. Price demonstrates to the public our stewardship over public funds

We need to develop the price component of the selection process to create a stronger link between the items asked for in the selection process and costs in the negotiation process. The price tool also needs to be developed in a way that allows us to select the contractor earlier in the process even as soon as the design consultant. This will enable contractor input at the beginning of the design process before too many design decisions are made.

We need to communicate to the contractor the need to complete the design before negotiations and before construction begins. This will affect the way they schedule their resources.

We need to provide more time for the Designer, Independent Cost Estimator and the Contractor to create cost estimates. This will reduce errors and reduce frustrations in negotiations.

#### ANALYSIS OF PERFORMANCE MEASURES

We are developing performance measures. This has proven to be a difficult task. One approach is to develop a correlation between size and cost for conventional projects and then overlay completed CMGC projects to see if there is a comparison. Creating a correlation between size and cost also means selecting projects of comparable complexity.

To perform such an analysis it is necessary to determine a measure of size. The most likely size measure is surface area but our ePM and PDBS data systems do not provide this information and we are searching other data systems to find useful data.

Measures are a tricky business and should begin with goals and objectives from which we design measures. Once the measures are created we can then build data systems to collect the information we need. However, our data systems were designed for projects and the process to support those projects. Our data systems do not support a business systems analysis where we collect data to support business measures linked to goals and objectives we want to achieve. It is therefore difficult to determine performance and compare CMGC, Design Build, and Design Bid Build processes.

With these hurdles in mind we are investigating different approaches. One approach is to select a set of items that are common across many projects and compare item costs from project to project to look for trends. We still need to consider complexity as we look for trends and data correlations.

Another measure is to look for trends in the initial and final bid openings as shown in table 3 below. Initial bid openings have shown differences of more than ten percent. Ten percent is a concern because by state law we are not allowed to award a contract to a single bidder that is more than 10% above the engineers estimate. To validate our engineer estimates we have initiated a red flag analysis on future CMGC projects and we are considering the need for management approval if the contractor's final bid is higher than the engineers estimate by more than 10%. The Independent Cost Estimate is a second check of the contractor's price but even if it is within 10% of the contractors bid we expect the engineers estimate to be within 10%. The EE and the ICE are two independent estimates that should support each other and validate the contractors bid price.

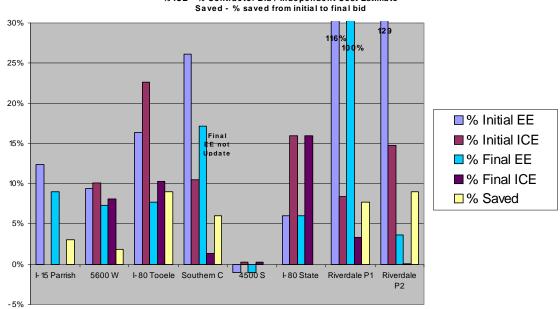
The last column in the table shows a promising trend because the final contract price shows a savings over the contractors initial bid price.

| CMGC Projects                 |              | Initial Bid  | Openin       | 3    |      |              | Final Bid    | Opening      | J    |      |       |
|-------------------------------|--------------|--------------|--------------|------|------|--------------|--------------|--------------|------|------|-------|
| Project                       | EE           | ICE          | Contractor   | % EE | %ICE | EE           | ICE          | Contractor   | % EE | %ICE | Saved |
| Redwood Rd 2320 S to 3500 S   | N/A          | N/A          | N/A          | N/A  | N/A  | \$6,593,398  | \$0          | \$6,647,500  | 101% | N/A  | N/A   |
| I-15 Parrish Lane             | \$75,608     | N/A          | \$85,000     | 112% | N/A  | \$75,608     | N/A          | \$82,400     | 109% | N/A  | 3.1%  |
| RS-172 5000 S to 6200 S       | \$2,326,171  | \$2,310,181  | \$2,544,614  | 109% | 110% | \$2,326,172  | \$2,310,182  | \$2,497,677  | 107% | 108% | 1.8%  |
| I-80 Area BLVD Tooele         | \$4,159,637  | \$3,945,159  | \$4,840,302  | 116% | 123% | \$4,085,442  | \$3,990,366  | \$4,402,052  | 108% | 110% | 9.1%  |
| Southern Corridor             | \$30,602,366 | \$34,936,348 | \$38,611,268 | 126% | 111% | \$30,975,849 | \$35,814,639 | \$36,293,459 | 117% | 101% | 6.0%  |
| 4500 S @ I-215                | \$4,036,311  | \$3,984,584  | \$3,995,048  | 99%  | 100% | \$4,036,311  | \$3,984,584  | \$3,995,048  | 99%  | 100% | 0.0%  |
| 5600 West 4450 to 4700 S P1   | \$29,940     | N/A          | \$29,940     | 100% | N/A  | \$29,940     | N/A          | \$29,940     | 100% | N/A  | 0.0%  |
| 5600 West 4450 to 4700 S P2   |              |              |              |      |      | \$1,842,699  | \$1,704,111  | \$1,714,730  | 93%  | 101% |       |
| I-80 State St to 1300 E P1    | \$5,706,332  | \$5,215,958  | \$6,050,432  | 106% | 116% | \$5,706,332  | \$5,215,958  | \$6,050,432  | 106% | 116% | 0.0%  |
| I-80 State St to 1300 E P3    |              |              |              |      |      |              |              |              |      |      |       |
| Riverdale Phase 1             | \$1,320,312  | \$2,635,934  | \$2,857,413  | 216% | 108% | \$1,320,312  | \$2,549,341  | \$2,635,934  | 200% | 103% | 7.8%  |
| Riverdale Phase 2             | \$5,172,651  | \$10,322,999 | \$11,851,504 | 229% | 115% | \$10,410,776 | \$10,778,168 | \$10,786,287 | 104% | 100% | 9.0%  |
| Riverdale Phase 3             |              |              |              |      |      |              |              |              |      |      |       |
| I-15 Bridge Deck Spanish Fork |              |              |              |      |      |              |              |              |      |      |       |
| Virgin River Trail            |              |              |              |      |      |              |              |              |      |      |       |
| SR-9 Hurricane                |              |              |              |      |      |              |              |              |      |      |       |

Table 3 Initial and Final Bid openings on CMGC projects

#### **CMGC Bid Openings**

% EE - % Contractor Bid / Engineers Estimate
% ICE - % Contractor Bid / Independent Cost Estimate
Saved - % saved from initial to final bid



#### CONCLUSIONS AND RECOMMENDATIONS

Use CMGC as the primary delivery method unless schedule is the principle driver. When a shorted delivery schedule is the primary motivation design build should be used. If the contractor cannot deliver the project for a fair price then the fall back position is Bid Build. I make this recommendation because we should always want the contractor's input to reduce risk, cost, and construction time. We should only go to Bid Build when we cannot get a fair price. We should not go to CMGC to reduce schedule because it commits us to the contractor too quickly and drives up our costs.

Early procurement phasing is desirable as long as no construction is involved and the phasing is severable from the construction phases. We should not begin early construction phasing unless the design is complete for the phase and the construction task is independent and servable from any future construction.

Share the construction budget with the contractor and help them to understand that unless they can deliver within ten percent of the engineering estimate we do not have an approved project and we will go to bid build. They should know that designing within budget is a part of the project. We want the best results for the funding we have with UDOT standards applied.

#### **APPENDIX A**

#### PROJECT DESCRIPTIONS

Redwood Road 2320 South to 3500 South

This project added the following improvements:

- New pedestrian bridge at Redwood Elementary (2650 South)
- Reconstruction of the roadway to a consistent cross section of three lanes in each direction with a center turn lane
- Curb, gutter, improved storm-water drainage and 4-foot sidewalks in both sides of the roadway

4500 South & I-215

This project will remove and replace the existing bridge structure over I-215 East at 4500 south. Accelerated Bridge Construction techniques will be used to remove the bridge and replace it over a weekend. This innovative technique will use a Self Propelled Modular Transport (SPMT) to move the bridge into place.

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

This project, located near Spanish Fork involves replacing the decks and approach slabs of three (3) pairs (NB & SB) of I-15 bridges. One pair is over a local road (100 South, Spanish Fork), one pair over UPRR railroad tracks for an industrial spur immediately to the north and the third pair over Spanish Fork River. Minor structural repairs to existing superstructures will be performed.

Southern Corridor (Atkinville interchange to River Road)

No Project description in RFP

Virgin River Trail Phase I & II, Washington City

This project will provide a bicycle/pedestrian facility through rugged terrain. The trail will wind through small canyons, large rock outcroppings and boulders. Alignment and creative excavations will minimize blasting and excavation costs.

#### Parrish Lane @ I-15

The project widened and added a new westbound lane to the Parrish Lane Bridge over I-15 as well as made geometric and capacity improvements to the interchange ramps. Widening also accommodated a new eastbound lane for the future. The project helped to ease traffic congestion at the interchange. It also improved the efficiency of traffic flow as Parrish Lane will eventually serve as a connector to the Legacy Parkway in Fall 2008.

#### Riverdale Road

This project will add improvements to SR-26; Riverdale Road in Weber County, Utah. This is a high traffic business and shopping area. Riverdale Road begins at 1900 West in Roy and continues northeast for 3.7 miles to Washington Blvd. in Ogden. Along this route I-84 and I-15 bridges will be replaced using accelerated bridge. The roadway will be reconstructed to a consistent cross section of three lanes in each direction with a center turn lane

5600 West: 5000 to 6200 South

Lisa Wilson

5600 West; 4450 to 4700 South

Lisa Wilson

I-80 Wendover; Aria Blvd.

This project will construct a partial freeway interchange from I-80 to Wendover at milepost 0 on the Utah State Line. The interchange will include a westbound off-ramp from I-80, as well as an eastbound on-ramp to I-80. The project is being constructed using private funds.

I-80 State St to 1300 East

This project will provide improvements to I-80, from State Street to 1300 East in Salt Lake City. As a part of this project, the following improvements will be constructed:

- Additional General Purpose Lane: Eastbound and Westbound
- Interchange Improvements at State Street, 700 East, and 1300 East
- Auxiliary Lane between each Interchange: Eastbound and Westbound
- Retaining Walls to Reduce Right-of-Way Impacts
- Noise/Sound Walls in Qualified Areas (outcome pending ballot results later this summer)
- New Concrete Pavement

New Bridges at State Street (pending funding), 300 East, 500 East, 600 East, 700 East, 900 East, and Highland Drive

I-70 Eagle Bridge

Rick Torgersen

SR-9 in Hurricane

Rick Torgersen

#### **BUDGET ANALYSIS**

Budget information was solicited from the project managers for each of the projects listed below and no comments were provided.

- Redwood Road 2320 South to 3500 South
- 4500 South & I-215
- I-15 Bridge Deck Repairs, Spanish Fork to Santaquin
- Southern Corridor (Atkinville interchange to River Road)
- Virgin River Trail Phase I & II, Washington City
- Parrish Lane @ I-15
- Riverdale Road
- 5600 West; 5000 to 6200 South
- 5600 West; 4450 to 4700 South
- I-80 Wendover; Aria Blvd
- I-80 State Street to 1300 East
- I-70 Eagle Bridge
- SR-9 in Hurricane

#### **SCHEDULE ANALYSIS**

Redwood Road 2320 South to 3500 South

The design schedule was shortened due to the contractor's involvement in the design.

However, the construction schedule was lengthened due to the delayed start. The project team felt that UDOT needs an independent time estimate in real time as well as an ICE. In CMGC the scope is usually expanded. With scope changes additional time is also required? In the RFP, the major items are listed for bidding, but several minor items are not identified. The Project Manager recommended that adding "Anticipate typical urban construction items" to the RFP would have provided a more accurate bid.

#### 4500 South & I-215

The design schedule was shortened because the contractor was hired early on in the process and a bridge move in date was fixed. The need to order steel required an early bid package. The construction schedule is shortened because of the use of ABC. If the CMGC were not the contracting method, this project would have increased by an entire construction season.

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

Not initiated

Southern Corridor (Atkinville interchange to River Road)

Construction has just begun

Colorado River Bridge

Not Initiated

Virgin River Trail Phase I & II, Washington City

Construction has not begun

Parrish Lane @ I-15

The Parrish Lane project had to be built rapidly to meet the demands of the surrounding economic growth. The design and construction schedules were fast track.

Riverdale Road

The project schedule is expected to be shorter because 100%-completed design is not needed to begin construction.

5600 West; 5000 to 6200 South

The design schedule was shortened by two months due to the use of CMGC.

5600 West; 4450 to 4700 South

The design schedule was shortened by two months due to the use of CMGC. The construction schedule would have been shortened had there not been a railroad agreement in place.

I-80 Wendover; Aria Blvd.

The design schedule is longer than usual due to the mistakes in the designer's plans. The construction schedule is not expected to be lengthened or shortened.

I-80 State Street to 1300 East

This project is running parallel activities which will save approximately one construction season. The project is expected to have three phases –

- 1. Early Action Package (MOT, steel, and MSE wall panels)
- 2. Eastbound I-80
- 3. Westbound I-80

I-70 Eagle Bridge

Not initiated

SR-9 in Hurricane

Not initiated

#### CHANGE ORDERS

Redwood Road 2320 South to 3500 South

This was our first CMGC project and we had a lot to learn. There were twelve change orders as part of this project. The first change order was due to the delayed project start and the increase in prices. The Project Manager felt that the main issue is putting specific dates for delivery of design items in the RFP and meeting those dates. The timing of this project was bid in Spring and final negotiation occurred nearly one year later. In that time frame, prices increased 20%. It is important to commit to the price and delivery dates.

Several of the change orders were items that could have been cleared up in the design process with better coordination.

4500 South & I-215

There has been one change order thus far in this project. The change order was for the second phase of the project. The Project Manager felt that there should be a different way to add a second phase other than a change order. The Project Manager also expects an additional change order to capture project cost savings of approximately \$100,000.

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

Contract has not been awarded

Southern Corridor (Atkinville interchange to River Road)

**Awaiting Response** 

Virgin River Trail Phase I & II, Washington City

Construction for this project has not begun

Parrish Lane @ I-15

There were seven change orders as part of this project. Some of the change orders were initiated by UDOT due to addition of funding to the project. After negotiation, there were funds remaining so additional scope was added. Due to the strong relationship developed through the CMGC process, UDOT change ordered the Syracuse Signal Project to the Parrish Lane project. This allowed for the fast track construction of the signal near a school.

#### Riverdale Road

There are currently no change orders on this project. However, the Project Manager expects to place a surcharge and pre-order the steel, as well as begin the construction of walls in an early construction phase.

5600 West: 5000 to 6200 South

None

5600 West: 4450 to 4700 South

The Project Manager is expecting a change order to reconstruct the railroad crossing. This was not brought forward in design due to coordination between UTA and Union Pacific.

I-80 Wendover; Aria Blvd.

There has been a change order for the rock blasting work. This was missed in the design process.

I-80 State Street to 1300 East

Currently, no change orders have been applied to this project. However, the Project Manager is expecting change orders with respect to the utilities.

I-70 Eagle Bridge

Not initiated

SR-9 in Hurricane

This is in the RFP stage and construction has not begun

#### **DESIGN FEEDBACK**

Redwood Road 2320 South to 3500 South

Some of the challenges brought forward in the design included the ATMS line, construction of driveways and drainage. The contractor identified the issues related to these items and recommended design changes.

4500 South & I-215

Having the contractor under contract early on in the design process has allowed the team to meet the rapid design schedule. The design was tailored for the contractor. Some of the challenges brought forward in the design included the use of a Self Propelled Modular Transporter (SPMT) to move the bridge into place. The slope of the bridge is at 12% and getting the SPMT contractor to understand the slope and the limitations of the area was challenging. The SPMT contractor was most familiar with flat surfaces. All of these challenges were resolved.

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

Design ongoing

Southern Corridor (Atkinville interchange to River Road)

The design has not begun

Virgin River Trail Phase I & II, Washington City

This project has not begun design

Parrish Lane @ I-15

Having the contractor under contract early on in the design process allowed the team to meet the rapid design schedule. Three major meetings were held, which included the contractor. These meetings helped identify major issues that could affect the construction schedule. Steel was a major item identified early on in the process which allowed for the advance purchase of steel. Some of the challenges brought forward in the design included maintenance of traffic (MOT) and structural challenges. All of these challenges were resolved.

#### Riverdale Road

Having the contractor under contract early on in the design process has allowed for approximately \$280,000 in savings thus far. An all-day workshop was held when the contractor was hired. One of the major issues to discuss was the drainage design. The designer had assumed that the contractor would not want to construct the storm drain laterals. The designer had several truck lines identified and the contractor felt that the construction of a large number of trunk lines would increase the schedule and the impacts to the public. The contractor suggested that the main trunk line be increased in size and that replacement of the laterals. This will avoid several utility disruptions and save approximately 8,000 feet of pipe.

5600 West; 5000 to 6200 South

Extra time was spent with the contractor and West Valley City to discuss the storm drain design details as well as utility impacts.

5600 West; 4450 to 4700 South

Extra time was spent with the contractor and West Valley City to discuss the storm drain design details as well as utility impacts.

I-80 Wendover; Aria Blvd.

Having the contractor under contract early on in the design process allowed for coordination on challenging design issues. There have been several concerns related to correct plans from the designer and meeting UDOT standards. The contractor has worked extensively with the designer on the rock blasting that is now required for the project.

I-80 State Street to 1300 East

Several months have been spent on the Accelerated Bridge Construction (ABC) components of this project such as, staging and movement of the structures. Innovations were added after the contractor was hired. This addition has added cost to the project.

I-70 Eagle Bridge

Not initiated

SR-9 in Hurricane

Not initiated

#### CONSTRUCTABILITY FEEDBACK

Redwood Road 2320 South to 3500 South

There were many unforeseen constructability issues on this project, including sinking caisson's and unknown foundations. The contractor helped identify some constructability issues in the design phase such as the pavement material and decorative fencing which helped optimize the design and reduce the project costs.

4500 South & I-215

There were several constructability issues that were brought forward by the contractor in the design, all of which were resolved in construction.

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

Not initiated

Southern Corridor (Atkinville interchange to River Road)

**Awaiting Response** 

Virgin River Trail Phase I & II, Washington City

This project has not begun construction

Parrish Lane @ I-15

The overall constructability of the project went well. There were no major constructability issues that were included in the design.

Riverdale Road

There are currently no change orders on this project. However, the Project Manager expects to place a surcharge and pre-order the steel, as well as begin the construction of walls.

5600 West: 5000 to 6200 South

The overall constructability of the project went well. Constructability issues that the contractor brought forward in the design were related to the storm drain and the depth of

the crossings.

5600 West; 4450 to 4700 South

The overall constructability of the project went well. Constructability issues that the contractor brought forward in the design were related to the storm drain and the depth of the crossings.

I-80 Wendover; Aria Blvd.

The overall constructability of the project went well. The driveways were redesigned at the contractor's request.

I-80 State Street to 1300 East

Weekly meetings are held to discuss all major disciplines of the project. The contractor has a vested interest in making this project constructible and is raising any issues at these weekly meetings. The contractor informs the team what construction methods will be simplified, reduce cost and reduce schedule. The constructability issues that the contractor has brought forward and implemented in the design include, ABC components, placement of sign structures, and placement of ATMS lines, sign foundations and treatments to the abutments.

I-70 Eagle Bridge

Not initiated

SR-9 in Hurricane

Not initiated

#### **INNOVATIONS**

Redwood Road 2320 South to 3500 South

Innovations used on this project included the use of a dual trunk line and the use of visual tools to express expected delay to the traveling public. The use of these innovations reduced construction costs and reduced impacts to the public.

4500 South & I-215

Several elements of Accelerated Bridge Construction (ABC) have been used on this project. The use of ABC, reduced the construction schedule, reduced impacts to the public and applied new technologies not used frequently by the Department.

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

Design beginning

Southern Corridor (Atkinville interchange to River Road)

**Awaiting Response** 

Virgin River Trail Phase I & II, Washington City

This project has not begun design

Parrish Lane @ I-15

Precast deck panels, an element of Accelerated Bridge Construction (ABC), were used on this project. The use of this innovation reduced the construction schedule, reduced impacts to the public and applied new technologies.

Riverdale Road

Accelerated Bridge Construction (ABC) will be used on the bridges. The use of this innovation is expected to reduce schedule in the segments where bridges are included. The contractor has proposed the use of moveable crossings and precast concrete panels for the driveways to allow access from the traffic to the businesses. These innovations

will reduce the impacts to the businesses along the corridor and meet one of the project goals of maintaining business access at all times. Utilizing an innovative public involvement technique, Business Bucks, will be used to encourage the public to support the businesses along the corridor during construction.

5600 West; 5000 to 6200 South

The use of a different granular borrow was explored but not used due to the water and the sub-grade.

5600 West; 4450 to 4700 South

The use of a different granular borrow was explored but not used due to the water and the sub-grade.

I-80 Wendover; Aria Blvd.

None

I-80 State Street to 1300 East

Innovations used on this project include, ABC and moveable barriers. The use of these innovations reduced the construction schedule, reduced impacts to the public and applied new technologies. Steel girders will be used on this project instead of concrete for ease of movement in the ABC process.

I-70 Eagle Bridge

Not initiated

SR-9 in Hurricane

Not initiated

#### **RISK**

Redwood Road 2320 South to 3500 South

The major risks on this project included utility coordination, impacts to the businesses/residents, and the schedule. The contractor's involvement in the design was crucial in prioritizing utilities and right-of-way clearance. The contractor also helped minimize risk by identifying the use of a dual trunk line

4500 South & I-215

The major risks on this project included schedule, the use of SPMT, and utilities conflicts. Having the contractor as part of the project team early on, helped identify these major risks and how to mange them.

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

Not Initiated

Southern Corridor (Atkinville interchange to River Road)

**Awaiting Response** 

Virgin River Trail Phase I & II, Washington City

This project has not begun design

Parrish Lane @ I-15

The major risk on this project was time. The interchange has to be open to traffic prior to the opening of the Walmart. With time being the major risk, CMGC and the use of ABC, reduced the overall schedule.

Riverdale Road

The major risks on this project include clearing of right-of-way and utility coordination. The contractor is assisting the project team with identification of the right-of-way that

needs to be cleared first

5600 West: 5000 to 6200 South

The major risks on this project were right-of-way and smaller utilities. The contractor helped minimize these risks by pot holing and identifying the locations of the utilities.

5600 West; 4450 to 4700 South

The major risks on this project were the railroad, right-of-way and smaller utilities. The contractor helped minimize these risks by pot holing and identifying the locations of the utilities.

I-80 Wendover; Aria Blvd.

The major risks on this project include the rock blasting and utilities which the contractor helped identify in the design process.

I-80 State Street to 1300 East

The major risks on this project include ABC, clearance of right-of-way, utilities and schedule. The contractor has helped in identification of these major risk items and minimization of those items. The contractor is handling all utility coordination. This has been crucial as it relates to ABC.

I-70 Eagle Bridge

Not Initiated

SR-9 in Hurricane

Not Initiated

#### LESSONS LEARNED

Redwood Road 2320 South to 3500 South

This project was the first CMGC project for this Project Manager and the Department. The project was bid much differently than the method that is currently used. There was a good exchange of information between the contractor and the designer. This process also helped all parties understand financial consequences. Formal meetings were held to involve the contractor and the designer however there was not a good vision on how these meetings were to be structured until the end of the project.

4500 South & I-215

This project was the first CMGC project for this Project Manager and the Department using Self Propelled Modular Transporter (SPMT).

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

Not initiated

Southern Corridor (Atkinville interchange to River Road)

**Awaiting Response** 

Virgin River Trail Phase I & II, Washington City

Design is just beginning

Parrish Lane @ I-15

This project was the first CMGC project for this Project Manager and also the fist using ABC.

Riverdale Road

This is the first CMGC project and the first ACB for this Project Manager. The Project Manager has learned that hiring the contractor early on has already presented a cost savings, simplified the construction, reduced costs, reduced the schedule and has

provided a reality check for the designers. With Design-Bid-Build the owner is in the dark until construction. With Design-Build, the owner gives up control to the Design-Builder because the contract is lump sum. CMGC allows all parties to add to the contract what is most important. Utilizing CMGC is a win-win for all involved.

5600 West; 5000 to 6200 South

This project was the first CMGC project for this Project Manager.

5600 West; 4450 to 4700 South

This project was the first CMGC project for this Project Manager.

I-80 Wendover; Aria Blvd.

The Project Manager has learned the importance of hiring the contractor earlier in the deign process to ensure major issues don't arise in construction.

I-80 State Street to 1300 East

This project was the first CMGC project for this Project Manager that included price as a selection criteria and also the fist using ABC.

I-70 Eagle Bridge

Not initiated

SR-9 in Hurricane

Not initiated

#### **INNOVATIONS**

Redwood Road 2320 South to 3500 South

Innovations used on this project included the use of a dual trunk line and the use of visual tools to express expected delay to the traveling public. The use of these innovations reduced construction costs and reduced impacts to the public.

4500 South & I-215

None reported

I-15 Bridge Deck Repairs, Spanish Fork to Santaquin

Just beginning design and the contractor is helping to evaluate alternatives

Southern Corridor (Atkinville interchange to River Road)

**Awaiting Response** 

Virgin River Trail Phase I & II, Washington City

Design is just beginning. Contractor is

Parrish Lane @ I-15

Precast deck panels, an element of Accelerated Bridge Construction (ABC), were used on this project. The use of this innovation reduced the construction schedule, reduced impacts to the public and applied new technologies.

Riverdale Road

Project is in design and the contractor is helping to evaluate our approach to construction Project phases were selected to minimize impact on the local business.

5600 West; 5000 to 6200 South

None reported

5600 West; 4450 to 4700 South

None reported

I-80 Wendover; Aria Blvd.

None reported

I-80 State Street to 1300 East
None reported
I-70 Eagle Bridge
Project has not begun
SR-9 in Hurricane
Project has just begun the RFP stage

#### APPENDIX B

# CMGC AGC Subcommittee Task Force Agenda/Minutes

#### **Subcommittee**

Attendees: Mike Seare, Ross Gravette, Clark Olsen, Kip Wadsworth, Kevin Howlett, Eric Wells, Carter Rorbough, Nathan Schellenberg, Kris Peterson, Rudy Alder, Robert Stewart, Stan Burns, Darrell Giannonatti, Mark Miller, J. C. Wheelwright, Norm Avery.

#### **CMGC - Process**

Fair, reasonable, and understandable rules Best value process based on qualifications and price

#### **Desired Outcome (Why are we doing CMGC?)**

Minimize risk, improve schedule, coordinate with designer Partnership instead of an adversarial relationship

Best method to try new innovations

Concerns: Low ball bidders who make up the difference later in the project. Price has the potential to distract from the other parts of the proposal and during the design and construction phases.

The group reaffirmed areas of agreement from past meetings and developed agreements on several new areas (See Section – Subcommittee Decisions)

#### **Proposal Phase**

#### Price and Qualifications

o Low bid vs. average bid

If the process requires price, the average bid is preferred (majority opinion)

Prefer low bid – plays to each contractor's competitive advantage (minority opinion, Wadsworth Brothers and R. Wadsworth) and is self correcting for a non-producing contractor

- o Approach to project and price
- o Price items

Obtain Contractors input on specific price items to be included in the RFP Consider using low bid on small projects, especially if proposal include approx. 75% of the final project bid items.

#### RFP

#### o Clearly defined

Clearly state goals for each project Define what is important and expected – then score proposals accordingly Decease the page requirement for small project proposals

Tell us what you don't want

Investigate hiring contractor at the same time or before hiring the Engineer.

Proposal should identify and quantify schedule savings and issues Department should then determine if Engineer is able to meet the schedule and hire accordingly.

Proposal should identify company cost and price savings.

#### Stipend

All contractors recommended not awarding a stipend for proposals, or for ideas.

The group will need further discussion on paying for ideas. Some members thought stipends were not required if the ideas of non-winning proposals were not made public. Other members would like to be compensated.

The group reaffirmed that UDOT will not pay a stipend. The group also agreed that if a non-winning contractor thought an idea was proprietary, the non-winning contractor would fill out a standard for (form to be developed by UDOT). The group also agreed that non-winning proposals would not be made public and would be destroyed. UDOT will clarify the RFP language to reflect the above agreement.

#### Selection process

#### o Interviews

Limit to top scoring contractors that have potential of being selected. Limit the number of individuals the contractor brings to the interview. Generally those involved in the design and construction (PM, Estimator, Superintendent).

Interview questions: Specific proposal clarification. Limit to approximately three questions.

#### Committee Members

#### Debrief

#### o Pertinent information

Publish all contractor proposals, prices and group selection committee scores.

Winning proposal is public but not Appendix E (minority opinion, Granite would like Appendix E published)

Non-winning proposals are not public

Do not show or publish approach to price

#### **Design Phase**

#### **Roles and Responsibilities**

#### o Required effort

Get the contractor on board early in the design phase. Perhaps pick the contractor first and then hire the consultant. Provide more time to this phase in order to refine the scope, cost and schedule.

Communication Required in Design

#### **Construction Phase**

- Price Negotiations
  - o GMP, Unit Price

The group agreed on the following GMP definition: GMP is the price that the contractor would charge "Today" for a specific item or the total project with the information known "Today". An executable GMP is defined as that point in time when both parties agree to sign a construction contract. The group agreed that GMP is a valuable tool and will be used in the CMGC process. The group recognized that the GMP of a project would evolve as risks were identified, eliminated and/or mitigated. We recommend that this evolution of price vs. risk vs. scope be documented.

o Independent Cost Estimate

The Independent Cost Estimate process is functioning as structured. The group was in agreement on the importance of a truly independent estimate. But the group also thought that the Independent Cost Estimator (ICE) needed to either attend more meetings or the department needed to improve the flow of information to the ICE.

- Phased Construction
  - o Early action items
- Final Bid Price Transparency

The group thought more work was needed with the department's PDBS. Winning bids are not always posted.

#### Conclusion

The subcommittee will continue to meet quarterly

The AGC representatives will present the findings of this group to the Heavy Highway Committee.

UDOT representatives will develop a list of projects suitable for the different contracting methods.

Desire of AGC members

- Want to review all proposals
   The Group agreed that only the winning proposal would be reviewed
- Want to see the price for every proposal

#### **Benefits of CMGC from AGC members**

- > Owner keeps control of design
- > Contractor influences design
- Quickly put contractor on contract to do construction
- > Better method of doing innovation
- ➤ Minimizes risk

- ➤ Helps to determine cost
- ➤ Less design

#### **Disadvantages of CMGC**

➤ Contractor not in charge and cannot control schedule

#### **Subcommittee recommendations:**

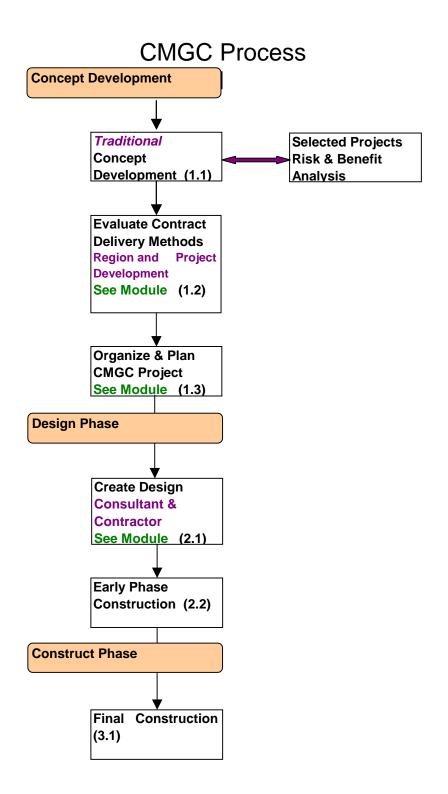
- The winning bid will be made public except for appendix E.
- Non-winning proposals will not be made public and will be destroyed after the selected contractor has signed the preconstruction contract.
- UDOT will not pay a stipend nor will UDOT pay for ideas. The group agreed that if a non-winning contractor thought an idea was proprietary, the non-winning contractor would fill out a standard form so stating (form to be developed by UDOT).
- The average bid is the preferred method to award points as long as price is included.
- Investigate hiring contractor at the same time or before hiring the engineer.
- The Independent Cost Estimation is an important function that should be continues with the recommendation that they attend more meetings during design to improve the flow of information. It should be the goal to develop a pool of qualified firms capable of performing this service.
- The AGC representative should continue to participate in contractor selections. UDOT will develop a method to verify the confidentiality statement.
- UDOT should clearly state goals for each project. They should also state what is not needed. Proposal should identify company cost and price savings. UDOT will enforce the rules of contact during the proposal phase.
- UDOT will decrease proposal page count for small projects and consider using low bid on small projects, especially if proposal includes approximately 75% of the final project bid items.
- The group agreed that GMP is a valuable tool and will be used in the CMGC process. They recognized that the GMP of a project would evolve as risks were identified, eliminated and/or mitigated. UDOT will track and document the evolution of price vs. risk vs. scope.
- Interviews:
  - O Limit to top scoring contractors that have potential of being selected.
  - O Limit the number of individuals the contractor brings to the interview.
  - O Generally those involved in the design and construction (PM, Estimator, Superintendent).
  - o Interview Questions: Specific proposal clarification. Limit to approximately three questions.

#### Conclusion

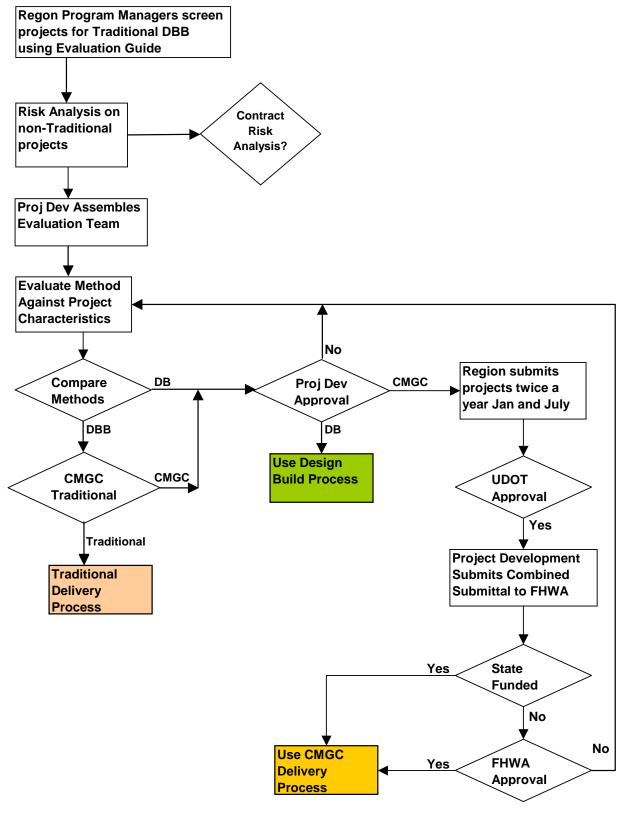
The subcommittee will continue to meet quarterly
The AGC representatives will present the findings of this group to the Heavy
Highway Committee

UDOT representatives will develop a list of projects suitable for the different contracting methods.

# **APPENDIX C**



# **Evaluate Contract Delivery Methods (1.2)**



#### 1.2 Evaluate and Select Contract Delivery Method

CMGC requires additional preparation and effort in the Concept Development stage to utilize this delivery method: however, contractor involvement in design reduces errors and improves constructability. Projects may experience a savings in design cost and reduce construction time. The contracting method evaluation guide provided below will help to evaluate the benefits and risks of contracting approaches. In general Design Build will support large projects with little right of way or utility risk while CMGC is more useful for projects with right of way and utility concerns and where UDOT wants to control design and select innovative solutions that a contractor is not experienced with.

| Design Bid Build   | Design Build  | CMGC   |
|--|---|--|
| Design and Constructability  | 9   |  |
| BENEFITS  Complete design  Process familiar to community  RISKS  Design is independent of contractor experience and abilities  | Contractor participation is expected to improve constructability and reduce errors and change orders, risk is identified and assigned an owner, expect fewer overruns     Less time and detail is required to communicate design      RISKS     Consultant works for Contractor and oversight is increased     UDOT does not control design and scope needs to be well defined  | <ul> <li>BENEFITS</li> <li>UDOT controls design</li> <li>Contractor participation is expected to improve constructability, reduce errors and change orders, identify and manage risk, and reduce overruns</li> <li>Design for Bid Build if a negotiated price is not achieved</li> <li>RISKS</li> <li>May increase design time if negotiation fails</li> </ul> |
| Innovation   |   |  |
| <ul> <li>BENEFITS</li> <li>UDOT can select innovation independent of contractor experience or abilities.</li> <li>RISKS</li> <li>Innovation may be considered a risk and limited to what benefits the contractor</li> </ul>  | Contractor participation is expected to encourage innovation      RISKS     Innovation may be limited to contractor abilities and comfort   | BENEFITS  UDOT can select innovation independent of contractor experience or abilities.  Contractor participation is expected to encourage innovation  Contractor participation is expected to moderate the risk of new technology innovations  RISKS  UDOT selected innovation may fail or increase cost and schedule   |
| Project Schedule   |   |  |
| <ul> <li>Proven record of performance for construction schedule</li> <li>RISKS</li> <li>Errors in design result in change orders and delay project completion</li> <li>Low bid selection results in schedule delays when contractors ideal projections do not occur</li> </ul> | BENEFITS     Less time in design and construction     Design is tailored to contractors abilities     Construction can begin before design is complete     RISKS     Considerable time and effort in RFP  | BENEFITS Compress schedule by early start Long lead items Utility & Right of Way Earthwork Crossover construction Pre-casting Video pipe MOT improves with contractor inputs Shorten time between design and construction RISKS Unable to negotiate on price and design is sent out for bid.   |
| Risk   |   |  |
| <ul> <li>Utilities and R/W managed during design using the same consultant which results in less chance of error and rework</li> <li>RISK</li> <li>Contractor may avoid risk.</li> <li>Motivated to makeup for low bid in change orders</li> </ul>                             | <ul> <li>BENEFITS</li> <li>Contractor will help identify and accept ownership of some risk</li> <li>Risk transfer to the Contractor RISK</li> <li>Increased proposal costs may limit bidders</li> <li>Higher risk for projects with R/W and Utilities</li> <li>Contractor may avoid risk.</li> <li>Contractor may drive consultant to reduce cost at risk to quality</li> </ul> | <ul> <li>BENEFITS</li> <li>Contractor will help identify and manage risk</li> <li>R/W after design reduces errors and rework</li> <li>RISK</li> <li>Opportunity to increase cost on non proposal items</li> <li>Lacks motivation to manage small quantity cost</li> <li>Sole source contract</li> </ul>  |

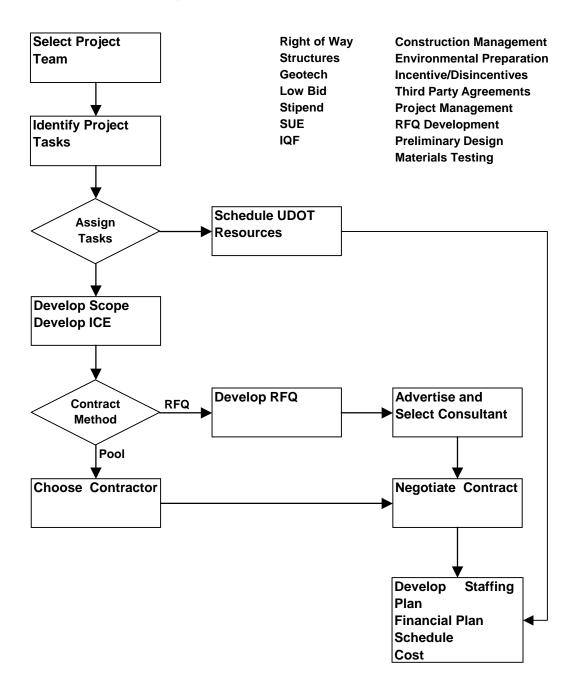
No cost savings return to UDOT

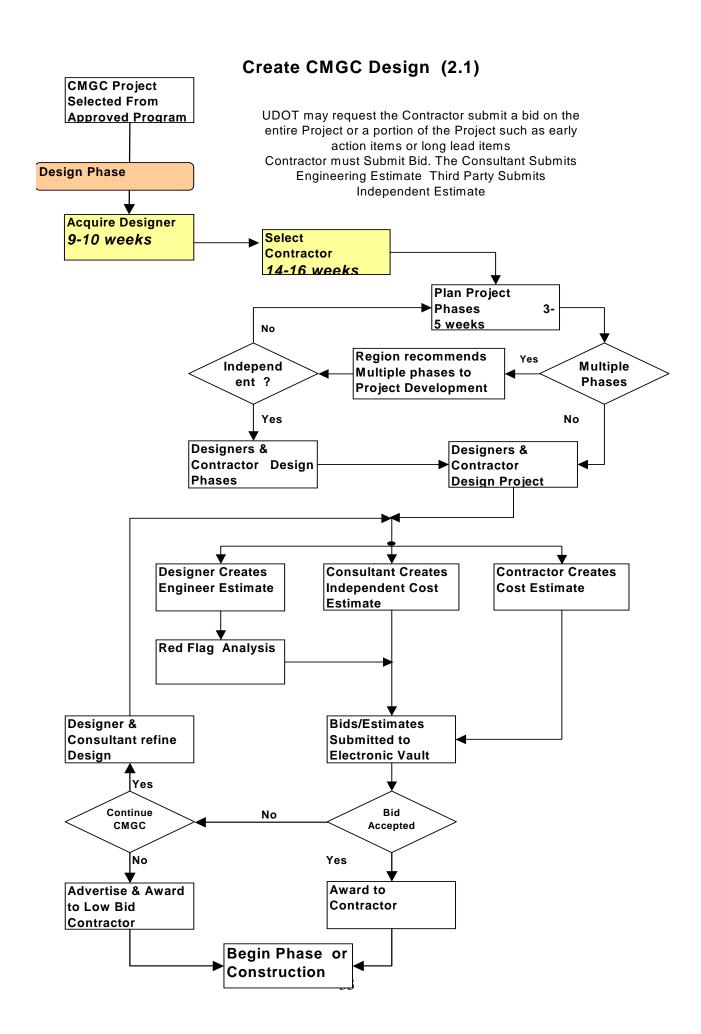
| Public   |   |   |
|--|---|---|
| BENEFIT  Low cost provider  Proven delivery method  Cost   | BENEFIT  Reduced delivery time Reduced errors and omissions Create a quick fixed cost   | BENEFIT  Reduced delivery time Reduced errors and omissions   |
| BENEFIT  Low bid  RISK  Errors, omissions, and unknowns will drive up cost through change orders | ■ Contractor input into MOT and Utilities should reduce cost  RISK ■ We are paying for the contractors involvement in the design phase which may increase total cost  | <ul> <li>BENEFIT</li> <li>Unknown conditions, ROW, and Utilities may drive up cost</li> <li>RISK</li> <li>We pay for risk transferred to contractor</li> <li>We pay for RFP development by multiple contractors</li> <li>We pay for contractor involvement in design</li> </ul> |
| Project Types  | <ul> <li>Good for projects in which UDOT wants to maintain control and apply new technology and processes</li> <li>Better for Projects with a lot of R/W and Utility issues</li> <li>Better for projects that can benefit from early purchases</li> </ul> | Good for projects with little R/W and minimal Utility impacts such as interstate and rural Road projects  |

The CMGC process begins with the Project Manager preparing a written justification of the benefits to include innovation, cost savings, schedule savings, etc. These projects are submitted to project development every six months for approval. The six-month window is a requirement of FHWA who would like a range of projects to include local government projects, bridge projects, ITS projects, large projects, and mixed construction projects. There intent is to evaluate the CMGC method on a variety of projects to measure its potential to reduce life cycle costs while maintaining product quality. The intent is to have 24 projects with 6 projects in each region over a 2-year period. If no Federal funding is used 6 additional projects may be approved per region.

The project justification must be specific to the project being proposed. The contract evaluation guide is a compilation of potential benefits and risks from many projects.

# **Organize & Plan Project (1.3)**





#### 2.1 Create CMGC Design

The design process is improved when a contractor is selected early. The more complete the design the less influence a contractor has in the process because with time it becomes more difficult to make design changes. If an external consultant is selected to develop the design and create the RFP to select the contractor the process is delayed even further. A nominal timeline for the selection process is a 107 days.

To shorten the timeline it is suggested that an internal designer be utilized to develop plans sufficiently to estimate initial quantities. These quantities are used during the contractor selection process. When these quantities can be estimated in the concept phase before project approval then it is possible to shorten project time even further.

After a contractor is selected and the contract is awarded, UDOT may request the contractor submit a bid on the entire project, an early phase of the project (early action items, or long lead items). Each phase requires a separate contract and contracting process to include the contract-advertising checklist.

It is important that early contract awards be planned and independent so they do not commit UDOT to the contractor for final construction until a negotiated price for construction is accomplished. To insure phase independence a management review is required by the Project Development office. The process is for the region to plan out their phase approach and submit each phase request to Project Development. Project Development forms a team of reviewers who establish evaluation criteria and evaluate the proposal for independence. On early procurements for example the criteria may ask the question do the items proposed require a long lead to procure and will the purchased items belong to UDOT in the event that the contractor is not selected for final construction.

Before proceeding to any contract award the design must be completed to a level of detail acceptable to the contractor, the designer, and UDOT. Then the award process can begin with cost submittals into the electronic vault from the contractor, the designer, and the third party independent estimator. If the contractor's initial bid is not within 110% of the independent estimate, the selection team has an opportunity to clarify assumptions with the contractor. Based on this information, the selection team will negotiate with the contractor.

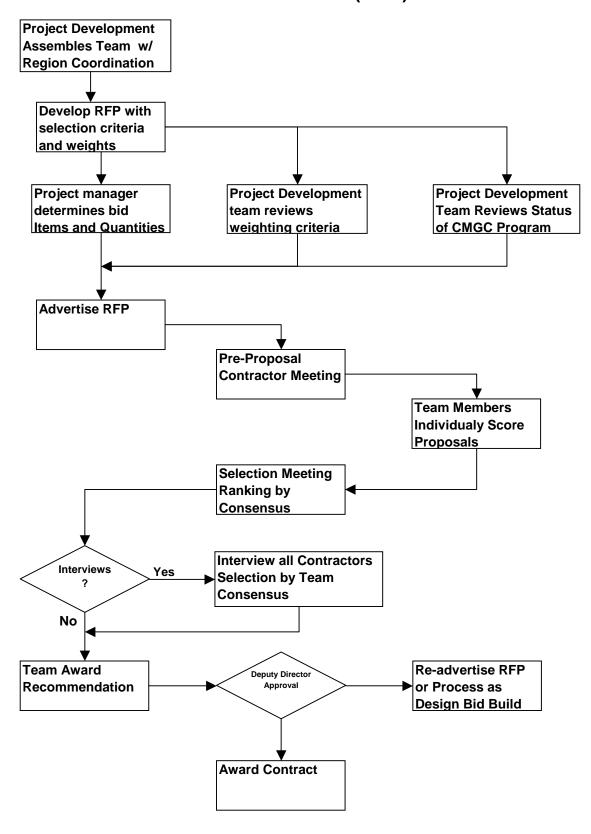
The primary goal of three independent cost estimates is to negotiate a fair price for UDOT at a fair price to the contractor and in the best interest of the State. If the contractor's proposal is not within 10% of the Independent Cost Estimate a corporate decision must be made to continue the CMGC process or to proceed with a Bid Build approach. If a decision is made to continue with CMGC the designer and consultant will need to refine the design and all three cost estimates must be updated and resubmitted to the electronic vault for consideration. It takes a corporate decision to award a contract that exceeds the Independent Cost Estimate by 10% or more.

Potentially, this process can lead to surprises when the bids are opened, especially if the approach to price varies significantly among the estimators. This can be minimized with improved communication on the nature of bid items. When the design is far enough along, the designer should be encouraged to prepare a measurement and payment list for the contractor and independent cost estimator. When bid items are understood a fair comparison is possible for each line item in the bid. Price comparisons are more achievable when the Project Manager communicates the approach to price for each bid item.

The Project manager should oversee meetings where the approach to price is discussed with no disclosure of actual pricing. This will permit incremental development of the cost estimates instead of waiting until the design is complete. Each estimator may begin to price items independently, based upon agreed measurements and payments. These estimates should be submitted to the electronic vault. The project manager may periodically open the electronic vault and compare all three estimates. If the project manager concludes that estimates for agreed upon items are within 10% he/she may lock in those unit prices with the contractor. This benefits the process by reducing the number of items that might vary in pricing when the design is complete. This can be done more than once throughout the design but not more than once a month. If quantities change during the design process, revisions are sent to all parties so they can adjust their pricing and resubmit to the electronic vault. This will facilitate an incremental price development that can progress with the design effort and be close to completion when the design is complete.

To facilitate this process the contractor is encouraged to seek three bids on specialty items where work is subcontracted. Examples of specialty items may include traffic signals, HMA, street lighting, ATMS, accelerated bridge elements, etc. These items will be discussed at periodic cost accounting meetings and the contractor will indicate his choice based on best value and risk. The independent estimator, designer, and project manager may use these prices in their cost estimates, but the independent cost estimator must seek as many independent bids as possible to validate selected bids.

# **Select Contractor (2.1.1)**



### **APPENDIX D**

#### **CMGC MOI**

Revised May 5, 2007

#### MEMORANDUM OF UNDERSTANDING

Utah Department of Transportation and Federal Highway Administration

Alternative Contracting Process – SEP 14 Construction Manager General Contractor (CMGC)

The Utah Department of Transportation (UDOT) and Federal Highway Administration (FHWA) are by this Memorandum agreeing to the following the Construction Manager General Contractor (CMGC) process. FHWA has found UDOT's SEP-14 work plan for the CMGC method to be satisfactory and has granted the FHWA Utah Division discretion in selection of the number and type of projects. The program will follow the process outline in the attached documents; Alternative Contracting Process, SEP 14 and the CMGC flowchart processes

• Type and Number of Projects

UDOT and FHWA have agreed to evaluate a limited number of projects. The projects will be varied by type, size, complexity and geographic region.

- The program will consist of a total of up to 24 projects over two years.
  - o Each Region will be able to select up to 6 projects.
  - o Each Region will have projects that consist of the following:
    - .. Local Government
    - .. Bridge
    - ITS
    - . "Large" Project
    - Mixed Construction Projects (e.g. rest areas, landscape, railroad, utility).
- Stewardship

The FHWA Utah Division and UDOT Engineering Services Division (ESD) will have stewardship of the program. UDOT ESD will be responsible for the management of the program including overall program consistency, administration of RFP's and publication of reports.

Project Selection

UDOT/FHWA will semiannually approve a program of projects.

■ Region Recommendation –

Semiannually each Region will identify a list of projects they wish to be considered for the CMGC contracting process.

Project Screening –

Each project will be screened for justification, geographic location and project type. Project justification will include a comparison of using Design/Build vs. Design/Bid/Build vs. CMGC. The comparison of the three contracting methods may include an evaluation of risk, schedule, design, environmental, material availability and innovation.

UDOT ESD Recommendation –

UDOT will submit a letter of recommendation to the FHWA Utah Division for program/project approval.

■ FHWA Approval –

Final approval for the use of CMGC on a project will require FHWA approval.

#### **Measures and Reporting**

Project Measures and Reporting

Each project will require an initial report prepared at the conclusion of Phase I (construction NTP). A second and final report will be required at the conclusion of Phase II (final acceptance). Each report will discuss the evaluation criteria applicable to the project as well as any other factors deemed significant. Topics of discussion should include design and constructability innovations, project schedule, risk, learning opportunities, environmental stewardship and benefit to the public.

Program Measures and Reporting

UDOT will submit an annual report to the FHWA Utah Division at the beginning of the Federal fiscal year. The following items to be included in the report:

- Introduction
- Summary of Projects (includes descriptions, locations, construction costs and design
- o costs)
- o Budget analysis
- o Schedule Analysis
- Change Orders
- Lessons Learned
- Innovations
- Approval of Memorandum of Understanding

**Utah Department of Transportation** 

Stan Burns, P.E. Director of Engineering Services & Bridge Design

Date

Federal Highway Administration

Gregory Punske, P.E. Project Delivery Team Leader